

What is claimed is:

1. A method of joining a surface of a first ceramic component to a surface of a second ceramic component using a silver-based composition, the silver-based composition being a mixture of silver metal and a metal oxide, in which the metal in the metal oxide is a metal other than silver, the method comprising:

applying the silver-based composition to the surface of the first ceramic component;

applying the silver-based composition to the surface of the second ceramic component;

contacting the silver-based composition applied to the first ceramic component to the silver-based composition applied to the second ceramic component;

heating the surfaces of the first and second ceramic components to melt the applied silver-based compositions; and

cooling the surfaces of the first and second ceramic components to form a bond between the first and second ceramic components.

2. The method of claim 1 in which the first ceramic component comprises a varistor.

3. The method of claim 2 in which the second ceramic component comprises a varistor.

4. The method of claim 1 in which the first ceramic component comprises a metal oxide varistor.

5. The method of claim 4 in which the second ceramic component comprises a metal oxide varistor.

6. The method of claim 1 in which applying the silver-based composition to the surface of the first ceramic component includes:

preparing a powder of the metal oxide;  
mixing the prepared metal oxide powder to form a metal oxide paste;  
applying a foil of silver metal to the surface of the first ceramic component; and  
spreading the metal oxide paste onto the applied silver foil to obtain the silver-

5 based composition.

7. The method of claim 1 in which the silver-based composition melts at a  
temperature less than melting points of the first and second ceramic components.

10 8. The method of claim 7 in which the silver-based composition melts  
between around 900° Celsius and 1000° Celsius.

15 9. The method of claim 1 in which the silver-based composition is a mixture  
of silver metal and vanadium oxide.

10. The method of claim 9 in which the mixture comprises between around  
0.1 to around 10% vanadium oxide by weight.

20 11. The method of claim 1 further comprising compressing the first and  
second ceramic components together before heating the surfaces of the ceramic  
components.

12. The method of claim 1 in which applying the silver-based composition to  
the surface of the first ceramic component includes:

25 preparing the metal oxide and the silver metal;  
mixing the prepared metal oxide and the prepared silver metal to form a silver-  
based composition paste; and  
spreading the silver-based composition paste on the first ceramic component to  
obtain the silver-based composition.

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13. The method of claim 1 in which heating the surfaces of the first and second ceramic components comprises heating while in an air atmosphere or in a near air atmosphere.

5 14. A method of joining a surface of a first ceramic component to a surface of a second ceramic component using a silver-based composition, the silver-based composition being a mixture of silver metal and a metal oxide, in which the metal in the metal oxide is a metal other than silver, the method comprising:

10 applying the silver-based composition to the surface of the first ceramic component;

contacting the silver-based composition applied to the first ceramic component to the surface of the second ceramic component;

15 heating the surfaces of the first and second ceramic components to melt the applied silver-based composition; and

cooling the surfaces of the first and second ceramic components to form a bond between the first and second ceramic components.

20 15. The method of claim 14 in which the first ceramic component comprises a varistor.

16. The method of claim 15 in which the second ceramic component comprises a varistor.

25 17. The method of claim 14 in which the first ceramic component comprises a metal oxide varistor.

18. The method of claim 17 in which the second ceramic component comprises a metal oxide varistor.

30 19. The method of claim 14 in which applying the silver-based composition to the surface of the first ceramic component includes:

preparing a powder of the metal oxide;  
mixing the prepared metal oxide powder to form a metal oxide paste;  
applying a foil of silver metal to the surface of the first ceramic component; and  
spreading the metal oxide paste onto the applied silver foil to obtain the silver-

5 based composition.

20. The method of claim 14 in which the silver-based composition melts at a  
temperature less than melting points of the first and second ceramic components.

10 21. The method of claim 20 in which the silver-based composition melts  
between around 900° Celsius and 1000° Celsius.

22. The method of claim 14 in which the silver-based composition is a  
mixture of silver metal and vanadium oxide.

15 23. The method of claim 22 in which the mixture comprises between  
approximately 0.1 to approximately 10% vanadium oxide by weight.

20 24. The method of claim 14 further comprising compressing the first and  
second ceramic components together before heating the surfaces of the ceramic  
components.

25 25. The method of claim 14 in which applying the silver-based composition to  
the surface of the first ceramic component includes:

preparing the metal oxide and the silver metal;  
mixing the prepared metal oxide and the prepared silver metal to form a silver-  
based composition paste; and  
spreading the silver-based composition paste on the first ceramic component to  
obtain the silver-based composition.

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26. The method of claim 14 in which heating the surfaces of the first and second ceramic components comprises heating while in an air atmosphere or in a near air atmosphere.

5 27. A bonded component stack for use in a surge arrester, the stack comprising:

a first ceramic component having a surface;

a second ceramic component having a surface;

10 a silver-based composition brazed to the surfaces of the first and second ceramic components to bond the surface of the first ceramic component to the surface of the second ceramic component, the silver-based composition being a mixture of silver metal and a metal oxide, in which the metal in the metal oxide is a metal other than silver.

15 28. The stack of claim 27 in which the first ceramic component comprises a varistor.

29. The stack of claim 28 in which the second ceramic component comprises a varistor.

20 30. The stack of claim 27 in which the first ceramic component comprises a metal oxide varistor.

25 31. The stack of claim 30 in which the second ceramic component comprises a metal oxide varistor.

32. The stack of claim 27 in which the silver-based composition is brazed between the surfaces of the first and second ceramic components by applying the silver-based composition to the surface of the first ceramic component; contacting the silver-based composition applied to the first ceramic component to the surface of the second ceramic component; heating the surfaces of the first and second ceramic components to melt the applied silver-based composition; and cooling the surfaces of the first and

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second ceramic components to form a bond between the first and second ceramic components.

33. The stack of claim 27 in which the silver-based composition is brazed between the surfaces of the first and second ceramic components by compressing the first and second ceramic components together before heating the surfaces of the ceramic components.

34. The stack of claim 27 in which the silver-based composition is brazed between the surfaces of the first and second ceramic components by applying the silver-based composition to the surface of the first ceramic component; applying the silver-based composition to the surface of the second ceramic component; contacting the silver-based composition applied to the first ceramic component to the silver-based composition applied to the second ceramic component; heating the surfaces of the first and second ceramic components to melt the applied silver-based compositions; and cooling the surfaces of the first and second ceramic components to form a bond between the first and second ceramic components.

35. The stack of claim 34 in which the silver-based composition is brazed between the surfaces of the first and second ceramic components by compressing the first and second ceramic components together before heating the surfaces of the ceramic components.

36. The stack of claim 27 in which the silver-based composition melts at a temperature less than melting points of the first and second ceramic components.

37. The stack of claim 36 in which the silver-based composition melts between around 900° Celsius and 1000° Celsius.

38. The stack of claim 27 in which the silver-based composition is a mixture of silver metal and vanadium oxide.

39. The stack of claim 38 in which the mixture comprises between around 0.1 to around 10% vanadium oxide by weight.

5 40. A method of joining a first ceramic component to a second ceramic component using a silver-based composition, the silver-based composition being a mixture of silver metal and a metal oxide, in which the metal in the metal oxide is a metal other than silver, the method comprising:

10 placing the silver-based composition between the first ceramic component and the second ceramic component;

joining the first ceramic component to the second ceramic component;

heating the first and second ceramic components to melt the silver-based composition; and

15 cooling the first and second ceramic components to form a bond between the first and second ceramic components.